

Table 2-1
Toxicological Properties of Chemicals
Range I, Parcel 201(7)
Fort McClellan, Calhoun County, Alabama

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Substance [CAS]	IP ^a (eV)	Odor Threshold (ppm)	Route ^b	Symptoms of Exposure	Treatment	TWA ^c	STEL ^d	Source ^e	IDLH (NIOSH) ^f
Acetone [67-64-1]	9.7	13B100	Inh Ing Con	Irritated eyes, nose, and throat; headache, dizziness; dermatitis.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	750 ppm 750 ppm 250 ppm	1,000 ppm 1,000 ppm	PEL TLV REL	20,000 ppm
Fuel oil (diesel oil, medium)	?	?	Ing Inh Con	Ingestion causes nausea, vomiting, and cramps; depressed central nervous system, headache, coma, death; pulmonary irritation; kidney and liver damage; aspiration causes severe lung irritation, coughing, gagging, dyspnea, substernal stress, pulmonary edema; bronchopneumonia; excited, then depressed, central nervous system.	Eye: Irrigate promptly Skin: Soap wash Breath: Respiratory support Swallow: Immediate medical attention Aspiration: Immediate medical attention			PEL TLV REL	

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Gasoline [8006-61-9]	?	0.3	Inh Ing Con	Intoxication, headaches, blurred vision, dizziness, nausea; eye, nose throat irritation; potential kidney and other cancers. Carcinogenic.	Eye: Irrigate immediately (15 min) Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	300 ppm 300 ppm Ca, lowest feasible conc. (LOQ 15 ppm)	500 ppm 500 ppm	PEL TLV REL	?
n-Hexane [110-54-3]	10.18	65B248	Inh Ing Con	Lightheadedness; nausea, headache; numbness of the extremities, muscular weakness; irritation of the eyes and nose; dermatitis; chemical pneumonia; giddiness.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	50 ppm 50 ppm 50 ppm		PEL TLV REL	5,000 ppm
Isopropyl alcohol (isopropanol) [67-63-0]	10.16	43B200	Inh Ing Con	Mild irritation of the eyes, nose, and throat; drowsiness, dizziness, headache; dry, cracked skin.	Eye: Irrigate immediately Skin: Water flush Breath: Respiratory support Swallow: Immediate medical attention	400 ppm 400 ppm 400 ppm	500 ppm 500 ppm 500 ppm	PEL TLV REL	12,000 ppm
Motor Oil [NA]	?	?	Inh Ing	Irritated eyes, skin, respiratory system; usually only a problem if misted or ingested.	Eye: Irrigate immediately (15 min) Skin: Soap wash immediately Swallow: Immediate medical attention			PEL TLV REL	
Nitric acid [7697-37-2]	11.95	0.3B1	Inh Ing Con	Irritated eyes, mucous membranes, and skin; delayed pulmonary edema, pneumonitis, bronchitis; dental erosion.	Eye: Irrigate immediately Skin: Water flush promptly Breath: Respiratory support Swallow: Immediate medical attention	2 ppm 2 ppm 2 ppm	4 ppm 4 ppm 4 ppm	PEL TLV REL	100 ppm

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Portland cement			Inh	Fine gray powder that can be irritating if inhaled or in eyes.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention		10 mg/m ³ 10 mg/m ³ / total dust 5 mg/m ³ respirable fraction	TLV PEL/REL	
Sodium hydroxide [1310-73-2]	NA	NA	Inh Ing Con	Irritated nose; pneumonitis; burns eyes, and skin; temporary loss of hair.	Eye: Irrigate immediately Skin: Water flush immediately Breath: Respiratory support Swallow: Immediate medical attention		C 2 mg/m ³ C 2 mg/m ³ C 2 mg/m ³	PEL TLV REL	250 mg/m ³
Sulfuric acid [7664-93-9]	?	0.15	Inh Ing Con	Irritated eyes, nose, and throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatitis; dental erosion; tracheobronchitis; skin and eye burns; dermatitis.	Eye: Irrigate immediately Skin: Water flush immediately Breath: Respiratory support Swallow: Immediate medical attention	1 mg/m ³ 1 mg/m ³ 1 mg/m ³	3 mg/m ³	PEL TLV REL	80 mg/m ³

^aIP = Ionization potential (electron volts).

^bRoute = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; Con, Skin and/or eye contact.

^cTWA = Time-weighted average. The TWA concentration for a normal work day (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.

^dSTEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.

^ePEL = Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).

AEL = Airborne Exposure Limit.

TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value.

REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.

^fIDLH (NIOSH) Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

NE = No evidence could be found for the existence of an IDLH (NIOSH Pocket Guide to Chemical Hazards, Pub. 1998).

C = Ceiling limit value which should not be exceeded at any time.

Ca = Carcinogen.

NA = Not applicable.

? = Unknown.

LEL = Lower explosive limits.

LC₅₀ = Lethal concentration for 50 percent of population tested.

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LD₅₀ = Lethal dose for 50 percent of population tested.

NIC = Notice of intended change (ACGIH).

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Respirator Selection Guide, 3M Occupational Health and Safety Division, 1993.

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Warning Properties of Industrial ChemicalsXOccupational Health Resource Center, Oregon Lung Association.

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Table 4-1

**Action Levels
Supplemental Remedial Investigation
Range I, Parcel 201(7), Pelham Range
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When in Level C PPE

Analyte	Action Level	Required Action ^a
VOCs (volatile organic compound)	≥ 10 ppm above background in breathing zone (BZ)	Stop work, evacuate work area, upgrade to Level B.
Oxygen	$\geq 20\%$, $\leq 23\%$ $< 20\%$, $> 23\%$	Normal operations. Stop work, evacuate work area.
Flammable vapors	$\geq 10\%$ LEL $< 10\%$ LEL	Stop work, evacuate work area. Continue operations, monitor for VOCs.

When in Level D Modified/D PPE

Analyte	Action Level	Required Action ^b
VOCs	≥ 1 ppm above background in BZ	Stop activities, suspend work activities for 15 to 30 minutes, if readings are sustained then upgrade to Level C PPE.
Oxygen	$\geq 20\%$, $\leq 23\%$ $< 20\%$, $> 23\%$	Normal operations. Stop work, evacuate work area.
Flammable vapors	$\geq 10\%$ LEL $< 10\%$ LEL	Stop work, evacuate work area. Continue operations, monitor for VOCs.

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When in Support Zone

Analyte	Action Level	Required Action
VOCs	≥ 1 ppm above background in BZ	Evacuate support zone and re-establish perimeter of exclusion zone.

^a Four instantaneous peaks in any 15-minute period or a sustained reading for 5 minutes in excess of the action level will trigger a response.

^b Contact with the H&S manager must be made prior to continuance of work. The H&S manager may then initiate perimeter/integrated air sampling along with additional engineering controls. This may also trigger additional CWA monitoring by the Huntsville division prior to continuation of investigative operations.

No one is permitted to downgrade levels of PPE without authorization from the H&S manager.

Table 4-2

**Air Monitoring Frequency and Location
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Work Activity	Instrument	Frequency	Location
Staging equipment	OV Monitor	Initially for area	Breathing zone (BZ) of employees
Sampling (groundwater and subsurface soil)	OV Monitor LEL/O ₂ Monitor	Continuously Continuously	BZ of employees Support zone
Installing monitoring wells	OV Monitor LEL/O ₂ Monitor	Continuously Continuously	BZ of employees BZ of employees

OV = Organic vapor.

LEL/O₂ = Lower explosive level/oxygen.

Table 5-1

**Activity Hazard Analysis
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Activity	Potential Hazards	Recommended Controls
Initial UXO avoidance sweep and equipment staging	Slip, trip, and fall hazards	<ul style="list-style-type: none">X Determine best access route before transporting equipment.X Practice good housekeeping; keep work area picked up and clean as feasible.X Continually inspect the work area for slip, trip, and fall hazards.X Look before you step; ensure safe and secure footing.
	Heavy lifting	<ul style="list-style-type: none">X Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment.
	Falling objects	<ul style="list-style-type: none">X Stay alert and clear of materials suspended overhead; wear hard hat and steel-toed boots.
	Flying debris, dirt, dust, etc.	<ul style="list-style-type: none">X Wear safety glasses/goggles; ensure that eye wash is in proper working condition.
	Pinch points	<ul style="list-style-type: none">X Keep hands, fingers, and feet clear of moving/suspended materials and equipment.X Beware of contact points.X Stay alert at all times!
	Cuts/bruises	<ul style="list-style-type: none">X Use cotton or leather work gloves for material handling.
	Bees, spiders, and snakes	<ul style="list-style-type: none">X Inspect work area carefully and avoid placing hands and feet into concealed areas.
	Ticks	<ul style="list-style-type: none">X Wear light colored clothing (can see ticks better).X Mow vegetated and small brush areas.X Wear insect repellant.X Wear long sleeves and long pants.X Visually check oneself promptly and frequently after exiting the work area.
	Fire	<ul style="list-style-type: none">X Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Hazard communication	<ul style="list-style-type: none">X Label all containers as to contents and dispose of properly.X Ensure Material Safety Data Sheets (MSDS) are available for hazardous chemicals used on site.
	Noise	<ul style="list-style-type: none">X Sound levels above 85 decibels (dBA) mandates hearing protection.
	Lighting	<ul style="list-style-type: none">X Adequate lighting will be provided to ensure a safe working environment.
	Cold stress	<ul style="list-style-type: none">X Workers should wear insulated clothing when temperatures drop below 40 degrees Fahrenheit (EF).

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Activity	Potential Hazards	Recommended Controls
Initial UXO avoidance sweep and equipment staging (continued)		<ul style="list-style-type: none"> X Drink warm beverages on breaks. Refrain from drinking caffeinated beverages. X Remove wet clothing promptly. X Take breaks in warm areas. X Reduce work periods as necessary. X Layer work clothing.
	Poison ivy/oak/sumac	<ul style="list-style-type: none"> X Avoid plant areas if possible. X Wear long sleeves and long pants. X Promptly wash clothing that has contacted poisonous plants. X Wash affected areas immediately with soap and water.
	Heat rash	<ul style="list-style-type: none"> X Keep the skin clean and dry. X Change perspiration-soaked clothing, as necessary. X Bathe at end of work shift or day. X Apply powder to affected area.
	Heat cramps	<ul style="list-style-type: none"> X Drink plenty of cool fluids even when not thirsty. X Provide cool fluid for work crews. X Move victim to shaded, cool area.
	Heat exhaustion	<ul style="list-style-type: none"> X Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature). X Set up work/rest periods. X Use the Abuddy system.≡ X Allow workers time to acclimate. X Have ice packs available for use. X Take frequent breaks.

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Activity	Potential Hazards	Recommended Controls
Initial UXO avoidance sweep and equipment staging (continued)	Heat stroke	<ul style="list-style-type: none"> X Evaluate possibility of night work. X Perform physiological monitoring on workers during breaks. X Wear body cooling devices.
	Contact with moving equipment/vehicles	<ul style="list-style-type: none"> X Work area will be barricaded/demarcated. X Equipment will be laid out in an area free of traffic flow. X Barricades shall be used on or around work areas when it is necessary to prevent the inadvertent intrusion of pedestrian traffic. X Barriers shall be used to protect workers from vehicular traffic. X Barriers shall be used to guard excavations adjacent to streets or roadways. X Flagging shall be used for the short term (less than 24 hours) to identify hazards until proper barricades or barriers are provided. X Heavy equipment shall have backup alarms.
	Forklift operations	<ul style="list-style-type: none"> X Use qualified and trained forklift operators. X The operator shall not exceed the load capacity rating for the forklift. X The load capacity shall be clearly visible on the forklift. X Forklift operators shall inform their supervisor of any prescribed medication that they are taking that would impair their judgement.
	Portable electric tools	<ul style="list-style-type: none"> X Portable electric tools that are unsafe due to faulty plugs, damaged cords, or other reasons, shall be tagged (do not use) and removed from service. X Portable electric tools and all cord and plug connected equipment shall be protected by a ground-fault circuit interrupter (GFCI) device. X Electrical tools shall be inspected daily prior to use.

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Activity	Potential Hazards	Recommended Controls
Initial UXO avoidance sweep and equipment staging (continued)	Extension cords	<ul style="list-style-type: none"> X Extension cords that have faulty plugs, damaged insulation, or are unsafe in any way shall be removed from service. X Cords shall be protected from damage from sharp edges, projections, pinch points (doorways), and vehicular traffic. X Cords shall be suspended with a nonconductive support (rope, plastic ties, etc.). X Cords shall be designed for hard duty. X Cords shall be inspected daily.
	Lightning strikes	<ul style="list-style-type: none"> X Whenever possible, halt activities and take cover. X If outdoors, stay low to the ground. X Limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than laying on the ground). X Seek shelter in a building if possible. X Stay away from windows. X If available, crouch under a group of trees instead of one. X Keep all body parts in contact with the ground as close as possible. X Remain 6 feet away from tree trunk if seeking shelter beneath tree(s). X If in a group, keep 6 feet of distance between people.
	Thunderstorms, tornados	<ul style="list-style-type: none"> X Listen to radio or TV announcements for pending weather information. X Cease field activities during thunderstorm or tornado warnings. X Seek shelter. Do not try to outrun a tornado.
Surveying	Slip, trip, and fall hazards	<ul style="list-style-type: none"> X Site workers will be required to wear hard hat, safety glasses with side shields, work gloves, and steel-toe boots when working in the field. X Provide adequate lighting in all work areas. X Whenever possible, avoid routing cords and hoses across walking pathways. X Flag or cover inconspicuous holes to protect against falls. X Work areas will be kept clean and orderly. X Garbage and trash will be disposed of daily in approved refuse containers. X Tools and accessories will be properly maintained and stored. X Work areas and floors will be kept free of dirt, grease, and slippery materials.

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Activity	Potential Hazards	Recommended Controls
Surveying (continued)	Traffic accidents	<ul style="list-style-type: none">X Place physical barrier (i.e., barricades, fencing) around work areas regularly occupied by pedestrians.X If working adjacent to roadways, have workers wear fluorescent orange vests.X Use warning signs or lights to alert oncoming traffic.X Assign flag person(s) if necessary to direct local traffic.X Set up temporary parking locations outside the immediate work area.X Motor vehicle operators shall obey all posted traffic signs, signals, and speed limits.X Pedestrians have the right-of-way.X Wear seat belts when vehicles are in motion.
	Wildlife hazards	<ul style="list-style-type: none">X Workers should be cautious when driving through the site in order to avoid encounters with passing animals.
	Biological hazards	<ul style="list-style-type: none">X Walking through overgrown grass areas, watch for snakes (rattlesnakes, moccasins, copperheads).
	Ticks	<ul style="list-style-type: none">X Wear light colored clothing (can see ticks better).X Mow vegetated and small brush areas.X Wear insect repellent.X Wear long sleeves and long pants.X Visually check oneself promptly and frequently after exiting the work area.
	Poison ivy/oak/sumac	<ul style="list-style-type: none">X Avoid plant areas if possible.X Wear long sleeves and long pants.X Promptly wash clothing that has contacted poisonous plants.X Wash affected areas immediately with soap and water.
	UXO	<ul style="list-style-type: none">X UXO avoidance monitoring will be conducted by a UXO specialist prior to beginning activities.X If UXO is encountered, cease all activities, mark the location, and notify the site manager.

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Activity	Potential Hazards	Recommended Controls
Groundwater Sampling	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> X Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination. X Avoid skin contact with water. X Handle samples with care. X Only essential personnel will be in the work area. X Real-time air monitoring will take place before and during sampling activities. X All personnel will follow good hygiene practices. X Proper decontamination procedures will be followed. X All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.
	Cut hazards	<ul style="list-style-type: none"> X Use care when handling glassware. X Wear adequate hand protection.
	Hazard communication	<ul style="list-style-type: none"> X MSDSs shall be obtained for chemicals brought on site. X Label all containers as to contents.
	Strains/sprains	<ul style="list-style-type: none"> X Use the proper tool for the job being performed. X Get assistance if needed. X Avoid twisting/turning while pulling on tools, moving equipment, etc.
	Spills/residual materials	<ul style="list-style-type: none"> X Absorbent material and containers will be kept available where leaks or spills may occur.
	Lighting	<ul style="list-style-type: none"> X Adequate lighting will be provided to ensure a safe working environment.
	Unattended worker	<ul style="list-style-type: none"> X Use "buddy system" - visual contact will be maintained with the sampling technician during sampling activities.

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Activity	Potential Hazards	Recommended Controls
Soil Boring and Surface/Subsurface Sampling	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> X Stop immediately at any sign of obstruction. X Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination. X Only essential personnel will be in the work area. X Real-time air monitoring will take place before and during sampling activities. X All personnel will follow good hygiene practices. X Proper decontamination procedures will be followed. X All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.
	Cut hazards	<ul style="list-style-type: none"> X Use care when handling glassware. X Wear adequate hand protection.
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> X Site workers will be required to wear hard hat, safety glasses with side shields, work gloves, and steel-toe/shank boots when working in the field. X Whenever possible, avoid routing cords and hoses across walking pathways. X Flag or cover inconspicuous holes to protect against falls.
	Bees, spiders, and snakes	<ul style="list-style-type: none"> X Workers shall inspect the work area carefully and avoid placing hands and feet into concealed areas. X Evaluate need for sensitive workers to have prescribed antibiotic or medicine to combat onset of symptoms.
	Poison ivy/oak/sumac	<ul style="list-style-type: none"> X Avoid plant areas if possible. X Wear long sleeves and long pants. X Promptly wash clothing that has contacted poisonous plants. X Wash affected areas immediately with soap and water.
	Cold stress	<ul style="list-style-type: none"> X Workers should wear insulated clothing when temperatures drop below 40°F. X Drink warm beverages on breaks. Refrain from drinking caffeinated beverages. X Remove wet clothing promptly. X Take breaks in warm areas. X Reduce work periods as necessary. X Layer work clothing.

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Activity	Potential Hazards	Recommended Controls
Soil Boring and Surface/Subsurface Sampling (continued)	Access/egress hazards	<ul style="list-style-type: none"> X Use qualified and trained bushhog operator. X Keep employees out of the bushhog work area. X Utilize good housekeeping practices. X Keep aisleways, pathways, and work areas free of obstruction. X Clean ice or snow off of walkways or work stations. X Use appropriate footwear for the task assigned.
	Heat rash	<ul style="list-style-type: none"> X Keep the skin clean and dry. X Change perspiration-soaked clothing, as necessary. X Bathe at end of work shift or day. X Apply powder to affected area.
	Heat cramps	<ul style="list-style-type: none"> X Drink plenty of cool fluids even when not thirsty. X Provide cool fluid for work crews. X Move victim to shaded, cool area.
	Heat exhaustion	<ul style="list-style-type: none"> X Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature). X Set up work/rest periods. X Use the buddy system. X Allow workers time to acclimate. X Have ice packs available for use. X Take frequent breaks.
	Heat stroke	<ul style="list-style-type: none"> X Evaluate possibility of night work. X Perform physiological monitoring on workers during breaks. X Wear body cooling devices.

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Activity	Potential Hazards	Recommended Controls
Soil Boring and Surface/Subsurface Sampling (continued)	Lightning strikes	<ul style="list-style-type: none"> X Whenever possible, halt activities and take cover. X If outdoors, stay low to the ground. X Limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than laying on the ground). X Seek shelter in a building if possible. X Stay away from windows. X If available, crouch under a group of trees instead of one single tree. X Keep all body parts in contact with the ground as close as possible. X If in a group, keep 6 feet of distance between people.
	UXO	<ul style="list-style-type: none"> X UXO avoidance monitoring will be conducted by a UXO specialist prior to beginning activities. X If UXO is encountered, cease all activities, mark the location, and notify the site manager and UXO specialist.
	Accidental exposure to chemical agents	<ul style="list-style-type: none"> X Low-level real-time environmental monitoring will be performed by Quanterra Battelle Quicksilver Center. X Modified Level D personal protective equipment (PPE) will be required. During the first 15 feet depth of each monitoring well installation activity, downhole geophysics will be performed. X Engineering controls will be used as appropriate. X Personnel will be equipped with an emergency egress air supply pack.
Moving and Shipping Collected Samples	Heavy lifting	<ul style="list-style-type: none"> X Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift.
	Pinch points	<ul style="list-style-type: none"> X Keep hands, fingers, and feet clear of moving/suspended materials and equipment. X Beware of contact points. X Stay alert at all times!
	Cut hazards	<ul style="list-style-type: none"> X Wear adequate hand protection. Use care when handling glassware.
	Hazard communication	<ul style="list-style-type: none"> X Label all containers as to contents and associated hazards.
	Heavy lifting	<ul style="list-style-type: none"> X Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift.

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Activity	Potential Hazards	Recommended Controls
Material Storage	Flammable and combustible liquids	<ul style="list-style-type: none"> X Store in NO SMOKING AREA. X Fire extinguisher readily available. X Transfer only when properly grounded and bonded.
Disposal of Investigation-Derived Waste (IDW) (Forklift Operation)	Personnel injury, property damage, and/or equipment damage	<ul style="list-style-type: none"> X Use qualified and trained forklift operators. X The operator shall not exceed the load capacity rating for the forklift. X The load capacity shall be clearly visible on the forklift. X Forklift operators shall inform their supervisor of any prescribed medication that they are taking that would impair their judgement.
	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> X Stop immediately at any sign of obstruction. X Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination. X Only essential personnel will be in the work area. X Real-time air monitoring will take place before and during sampling activities. X All personnel will follow good hygiene practices. X Proper decontamination procedures will be followed. X All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.
	Cut hazards	<ul style="list-style-type: none"> X Use care when handling glassware. X Wear adequate hand protection.
High-Pressure Water Jetting Operations	Heavy lifting	<ul style="list-style-type: none"> X Use proper lifting techniques. X Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift.
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> X Good housekeeping shall be implemented. X The work area shall be kept clean as feasible. X Inspect the work area for slip, trip, and fall hazards.

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Activity	Potential Hazards	Recommended Controls
High-Pressure Water Jetting Operations (continued)	Fueling	<ul style="list-style-type: none"> X Only approved safety cans shall be used to store fuel. X Do not refuel equipment while it is operating. X Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Faulty or damaged equipment	<ul style="list-style-type: none"> X Equipment shall be inspected before being placed into service and at the beginning of each shift. X Preventive maintenance procedures recommended by the manufacturer shall be followed. X A lockout/tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
	High-pressure water	<ul style="list-style-type: none"> X Jetting gun operator must wear appropriate PPE including hard hat, impact-resistant safety glasses with side shields, water-resistant clothing, metatarsal guards for feet and legs, and hearing protection (if appropriate). X One standby person shall be available within the vicinity of the pump during jetting operation. X The work area shall be isolated and adequate barriers will be used to warn other site personnel.
	Unqualified operators	<ul style="list-style-type: none"> X Only qualified and trained personnel are permitted to operate machinery and mechanized equipment associated with water jet cutting and cleaning.
	Out of control equipment	<ul style="list-style-type: none"> X No machinery or equipment is permitted to run unattended. X Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
	Noise	<ul style="list-style-type: none"> X Sound levels above 85 dBA mandates hearing protection by nearby site personnel.
	Activation during repairs	<ul style="list-style-type: none"> X All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
	Pinch points	<ul style="list-style-type: none"> X Keep feet and hands clear of moving/suspended materials and equipment. X Stay alert and clear of materials suspended .
	Falling objects	<ul style="list-style-type: none"> X Hard hats are required by site personnel. X Stay alert and clear of material suspended overhead.
	Flying debris	<ul style="list-style-type: none"> X Impact-resistant safety glasses with side shields are required.

Table 5-1
Activity Hazard Analysis
Range I, Parcel 201(7), Pelham Range
Fort McClellan, Calhoun County, Alabama

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Activity	Potential Hazards	Recommended Controls
High-Pressure Water Jetting Operations (continued)	Contact with potentially contaminated materials	X All site personnel will wear the appropriate PPE.
Drilling and Installation of Monitoring Wells	Overhead hazards	X Make sure no obstacles are within radius of boom. Always stay a safe distance from power lines.
	Faulty or damaged equipment being utilized to perform work	X All machinery or mechanized equipment will be inspected by a competent mechanic and be certified to be in safe operating condition. X Equipment will be inspected before being put to use and at the beginning of each shift. X Faulty/unsafe equipment will be tagged and if possible locked out. X Drill rigs shall be equipped with reverse signal alarm, backup warning lights, or the vehicle is backed up only when an observer signals it is safe to do so.
	Uneven terrain, poor ground support, inadequate clearances, contact with utilities	X Inspections or determinations of road conditions and structures shall be made in advance to ensure that clearances and load capacities are safe for the passage or placing of any machinery or equipment. X All mobile equipment and areas in which they are operated shall be adequately illuminated. X Aboveground and belowground utilities will be located prior to staging equipment. X Whenever the equipment is parked, the parking brake shall be set. X Equipment parked on inclines will have the wheels chocked. X Inspect brakes and tire pressure on drill rig before staging for work.
	Inexperienced operator	X Machinery and mechanized equipment shall be operated only by designated personnel. X Operators shall inform their supervisor(s) of any prescribed medication that they are taking that would impair their judgment.
	Jacks/outriggers	X Ensure proper footing and cribbing.
	Falling objects	X Remove unsecured tools and materials before raising or lowering the derrick. X Stay alert and clear of materials suspended overhead.
	Pinch points	X Keep feet and hands clear of moving/suspended materials and equipment. X Stay alert at all times!

Table 5-1

**Activity Hazard Analysis
Range I, Parcel 201(7), Pelham Range
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Drilling and Installation of Monitoring Wells (continued)	Fire	<ul style="list-style-type: none"> X Mechanized equipment shall be shut down prior to and during fueling operations. X Have fire extinguishers inspected and readily available.
	Fall hazards	<ul style="list-style-type: none"> X Personnel are not allowed to work off of machinery or use them as ladders. X Use fall protection when working above 6 feet.
	Contact with rotating or reciprocating machine parts	<ul style="list-style-type: none"> X Use machine guards; use long-handled shovels to remove auger cuttings. X Safe lockout procedures for maintenance work.
	Heavy lifting	<ul style="list-style-type: none"> X Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift.
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> X Practice good housekeeping, keep work area picked up and clean as feasible. X Continually inspect the work area for slip, trip, and fall hazards.
	Contact with potentially contaminated materials	<ul style="list-style-type: none"> X Real-time air monitoring will take place. If necessary, proper personal protective clothing and equipment will be utilized. X Stop immediately at any sign of obstruction. X Do not breathe air surrounding boring unless necessary. X Upgrade to respirator if necessary. X Avoid skin contact with soil cuttings. Wear gloves. X Stay clear of moving parts of drill rig.
	Drum handling	<ul style="list-style-type: none"> X Be careful not to breathe air from around open drum any more than necessary. Monitor with photoionization detector/flame ionization detector (PID/FID) equipment and upgrade to respirator if necessary. X When filling a drum (with either soil or water), be careful not to make contact with the contained waste. Wear appropriate gloves. Make sure lid or bung of drum is secure. X If moving a drum unassisted, be sure to leverage properly, use proper lifting techniques, and wear safety glasses and steel-toed boots. X When using a drum dolly, make sure straps and lid catch are securely attached. Leverage properly when tilting drum. Be sure toes stay away from drum.

Table 5-1

**Activity Hazard Analysis
Range I, Parcel 201(7), Pelham Range
Fort McClellan, Calhoun County, Alabama**

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Activity	Potential Hazards	Recommended Controls
Drilling and Installation of Monitoring Wells (continued)	UXO	<ul style="list-style-type: none">X UXO avoidance monitoring will be conducted by a UXO specialist prior to beginning activities.X If UXO is encountered, cease all activities, mark the location, and notify the site manager and UXO specialist immediately.
	Accidental exposure to chemical agents	<ul style="list-style-type: none">X Low-level real-time environmental monitoring will be performed by Quanterra Battelle Quicksilver Center.X Modified Level D personal protective equipment (PPE) will be required. During the first 15 feet depth of each monitoring well installation activity, downhole geophysics will be performed.X Engineering controls will be used as appropriate.X Personnel will be equipped with an emergency egress air supply pack.